

WHAT IS CLAIMED IS:

1. A liquid ejection head comprising a plurality of opened liquid flow passages arranged side by side and communicating with ejection orifices through which a liquid is ejected, thermal energy generating elements for generating thermal energy utilized to eject the liquid through said ejection orifices and generating bubbles in the liquid, and movable members arranged in an opposed relation to said thermal energy generating elements and having free ends displaceable upon generation of the bubbles, said thermal energy generating elements and said movable members being arranged respectively in said plurality of opened liquid flow passages,

wherein at least one closed liquid flow passage closed at one end corresponding to the ejection orifice is provided in at least one end side of said plurality of opened liquid flow passages in a direction in which said opened liquid flow passages are arranged.

2. A liquid ejection head according to Claim 1, wherein said closed liquid flow passage is provided in both end sides of said plurality of opened liquid flow passages.

3. A liquid ejection head according to Claim 1,

wherein said liquid ejection head includes an ejection orifice plate joined to an end surface of a head body comprising an element substrate in which said thermal energy generating elements are formed, and a top plate joined to said element substrate in an opposed relation, said ejection orifice plate having said ejection orifices formed in positions corresponding to said opened liquid flow passages.

4. A liquid ejection head according to Claim 3, wherein said top plate has a reinforcing portion provided corresponding to said closed liquid flow passage and having one flat surface flush with the end surface of said head body.

5. A liquid ejection head according to Claim 4, wherein said reinforcing portion has a size enough to block off communication between said closed liquid flow passage and an outside.

6. A liquid ejection head comprising a plurality of opened liquid flow passages arranged side by side and communicating with ejection orifices through which a liquid is ejected, thermal energy generating elements for generating thermal energy utilized to eject the liquid through said ejection orifices and generating bubbles in the

liquid, and movable members arranged in an opposed relation to said thermal energy generating elements and having free ends displaceable upon generation of the bubbles, said thermal energy generating elements and said movable members being arranged respectively in said plurality of opened liquid flow passages,

wherein a plurality of closed liquid flow passages closed at one ends corresponding to said ejection orifices are provided in at least one end side of said plurality of opened liquid flow passages in a direction in which said opened liquid flow passages are arranged, and a flow resistance is provided only in a part of said plurality of closed liquid flow passages on the side near said opened liquid flow passages.

7. A liquid ejection head according to Claim 6, wherein said flow resistance is a movable member similar to said movable member.

8. A liquid ejection head according to Claim 6, wherein said closed liquid flow passages are provided in both end sides of said plurality of opened liquid flow passages.

9. A liquid ejection head according to Claim 6,

wherein said liquid ejection head includes an ejection orifice plate joined to an end surface of a head body comprising an element substrate in which said thermal energy generating elements are formed, and a top plate joined to said element substrate in an opposed relation, said ejection orifice plate having said ejection orifices formed in positions corresponding to said opened liquid flow passages.

10. A liquid ejection head according to Claim 9, wherein said top plate has a reinforcing portion provided corresponding to each of said closed liquid flow passages and having one flat surface flush with the end surface of said head body.

11. A liquid ejection head according to Claim 10, wherein said reinforcing portion has a size enough to block off communication between said closed liquid flow passage and an outside.

12. A liquid ejection head comprising a plurality of opened liquid flow passages arranged side by side and communicating with ejection orifices through which a liquid is ejected, and thermal energy generating elements for generating thermal energy utilized to eject the liquid through said ejection orifices and generating bubbles in the

liquid, said thermal energy generating elements being arranged respectively in said plurality of opened liquid flow passages,

wherein a plurality of closed liquid flow passages closed at one ends corresponding to said ejection orifices are provided in at least one end side of said plurality of opened liquid flow passages in a direction in which said opened liquid flow passages are arranged, and a flow resistance is provided only in a part of said plurality of closed liquid flow passages on the side near said opened liquid flow passages.

13. A liquid ejection head according to Claim 12, wherein said closed liquid flow passages are provided in both end sides of said plurality of opened liquid flow passages.

14. A liquid ejection head according to Claim 12, wherein said liquid ejection head includes an ejection orifice plate joined to an end surface of a head body comprising an element substrate in which said thermal energy generating elements are formed, and a top plate joined to said element substrate in an opposed relation, said ejection orifice plate having said ejection orifices formed in positions corresponding to said opened liquid flow passages.

15. A liquid ejection head according to Claim 14, wherein said top plate has a reinforcing portion provided corresponding to each of said closed liquid flow passages and having one flat surface flush with the end surface of said head body.

16. A liquid ejection head according to Claim 15, wherein said reinforcing portion has a size enough to block off communication between said closed liquid flow passage and an outside.

17. A method of manufacturing a liquid ejection head comprising the steps of:

preparing a body of said liquid ejection head, which comprises a plurality of liquid flow passages arranged side by side and communicating with holes at one ends thereof, and thermal energy generating elements for generating thermal energy utilized to eject a liquid through ejection orifices communicating with said holes and generating bubbles in the liquid, said thermal energy generating elements being arranged respectively in said plurality of liquid flow passages; and

joining the body of said liquid ejection head and an ejection orifice plate having said ejection orifices formed

therein in number less than the number of said holes to each other such that communication is maintained between a part of said holes and said ejection orifices, whereby said plurality of flow passage are divided into opened liquid flow passages communicating with said ejection orifices and closed liquid flow passages which are closed by said ejection orifice plate at one ends corresponding to said ejection orifices and are provided in at least one end side of said plurality of opened liquid flow passages in a direction in which said opened liquid flow passages are arranged.

18. A method of manufacturing a liquid ejection head according to Claim 17, further comprising the step of forming at least one of said closed liquid flow passages, in which a flow resistance giving resistance against the liquid flowing in the closed liquid flow passage is provided, between said opened liquid flow passages and the closed liquid flow passages other than said at least one closed liquid flow passage in which said flow resistance is provided.

19. A method of manufacturing a liquid ejection head according to Claim 18, further comprising the step of forming, as said flow resistance, a movable members arranged

in a bubble generating area of said closed liquid flow passage, in which bubbles are generated in the liquid, and having free ends displaceable upon growth of the bubbles.

20. A method of manufacturing a liquid ejection head according to Claim 17, further comprising the step of forming said closed liquid flow passages in both end sides of said opened liquid flow passages.

21. A method of manufacturing a liquid ejection head according to Claim 19, further comprising the step of preparing said head body by joining a top plate in an opposed relation to an element substrate in which said thermal energy generating elements are formed, and forming a reinforcing portion on said top plate in a position corresponding to each of said closed liquid flow passages, said reinforcing portion having one flat surface flush with an end surface of said head body.

22. A method of manufacturing a liquid ejection head according to Claim 21, further comprising the step of forming said reinforcing portion in size enough to block off communication between said closed liquid flow passage and an outside.



23. A method of manufacturing a liquid ejection head according to Claim 19, further comprising the step of filling a liquid into said opened liquid flow passages through suction from the end surface side of said head body.

24. A method of manufacturing a liquid ejection head according to Claim 23, further comprising the step of, after said filling step, applying energy to said energy generating elements in at least said closed liquid flow passages.